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### Amendments to the Claims

The listing of claims below will replace all prior versions and listings of claims in the application. The changes to currently amended claims are shown using strikethrough to identify deleted material and underlining to identify added material.

### Listing of Claims:

- 1-95. (canceled)
96. (currently amended) A method of performing an asymmetric catalytic reaction comprising:
- combining a first reactant, a second reactant, and a catalytic amount of a metal-free chiral hydrogen-bond donor in a solvent to form a reaction mixture; and
  - reacting the first reactant and the second reactant to form an enantiomeric excess of a reaction product.
97. (original) The invention of claim 96 wherein the reaction comprises a [4+2] cycloaddition.
98. (original) The invention of claim 96 wherein the reaction mixture is substantially free of metals.
99. (original) The invention of claim 97 wherein the first reactant comprises a diene and the second reactant comprises a heterodienophile.
100. (original) The invention of claim 99 wherein the heterodienophile comprises a carbonyl group.
101. (original) The invention of claim 99 wherein the heterodienophile comprises an aldehyde.

102. (currently amended) The invention of claim 99 wherein the heterodienophile comprises ~~an~~ a ketone.

103. (original) The invention of claim 99 wherein the heterodienophile comprises an  $\alpha,\beta$ -unsaturated carbonyl compound.

104. (original) The invention of claim 99 wherein the heterodienophile comprises an  $\alpha,\beta$ -unsaturated aldehyde.

105. (original) The invention of claim 96 wherein the chiral hydrogen-bond donor comprises a chiral alcohol.

106. (original) The invention of claim 105 wherein the chiral alcohol comprises a 1,3-diol group.

107. (original) The invention of claim 105 wherein the chiral alcohol comprises a 1,4-diol group.

108. (original) The invention of claim 105 wherein the chiral alcohol comprises a 1,6-diol group.

109. (original) The invention of claim 105 wherein the chiral alcohol comprises a TADDOL skeleton.

110. (original) The invention of claim 105 wherein the chiral alcohol is selected from the group consisting of TADDOL, 1-Naphthyl-TADDOL, 2-Naphthyl-TADDOL, TADDOL derivatives, BINOL, BINOL derivatives, tartaric acid dialkyl ester derivatives, and hydrobenzoin derivatives.

111. (original) The invention of claim 96 wherein the enantiomeric excess is at least 60 %.

112. (original) The invention of claim 96 wherein the enantiomeric excess is at least 70 %.
113. (original) The invention of claim 96 wherein the enantiomeric excess is at least 80 %.
114. (original) The invention of claim 96 wherein the enantiomeric excess is at least 90 %.
115. (original) The invention of claim 96 wherein the enantiomeric excess is at least 95 %.
116. (original) The invention of claim 97 wherein the first reactant comprises an alkyne and the second reactant comprises an aldehyde.
117. (original) The invention of claim 116 further comprising adding an organometallic reagent to the reaction mixture.
118. (original) The invention of claim 117 wherein the organometallic reagent is diethyl zinc.
119. (currently amended and withdrawn) A reaction mixture comprising:  
a first reactant selected from the group consisting of diene and an alkyne;  
a second reactant selected from the group consisting of a dienophile and an aldehyde, wherein the second reactant is complementary in reactivity to the first reactant;  
a solvent; and  
a catalytic amount of a metal-free chiral hydrogen-bond donor.

120. (withdrawn) The invention of claim 119 wherein the reaction mixture is substantially free of metals.

121. (withdrawn) The invention of claim 119 wherein the first reactant comprises a diene and the second reactant comprises a dienophile.

122. (withdrawn) The invention of claim 121 wherein the dienophile comprises a heterodienophile.

123. (withdrawn) The invention of claim 122 wherein the heterodienophile comprises a carbonyl group.

124. (withdrawn) The invention of claim 122 wherein the heterodienophile comprises an aldehyde.

125. (withdrawn) The invention of claim 122 wherein the heterodienophile comprises an  $\alpha,\beta$ -unsaturated aldehyde.

126. (withdrawn) The invention of claim 119 wherein the first reactant comprises an alkyne and the second reactant comprises an aldehyde.

127. (withdrawn) The invention of claim 126 wherein the reaction mixture further comprises an organometallic reagent.

128. (withdrawn) The invention of claim 127 wherein the organometallic reagent comprises diethylzinc.

129. (withdrawn) The invention of claim 119 wherein the chiral hydrogen-bond donor comprises a chiral alcohol.

130. (withdrawn) The invention of claim 129 wherein the chiral alcohol comprises a 1,3-diol group.

131. (withdrawn) The invention of claim 129 wherein the chiral alcohol comprises a 1,4-diol group.

132. (withdrawn) The invention of claim 129 wherein the chiral alcohol comprises a 1,6-diol group.

133. (withdrawn) The invention of claim 129 wherein the chiral alcohol comprises a TADDOL skeleton.

134. (withdrawn) The invention of claim 129 wherein the chiral alcohol is selected from the group consisting of TADDOL, 1-Naphthyl-TADDOL, 2-Naphthyl-TADDOL, TADDOL derivatives, BINOL, BINOL derivatives, tartaric acid dialkyl ester derivatives, and hydrobenzoin derivatives.

135. (canceled)